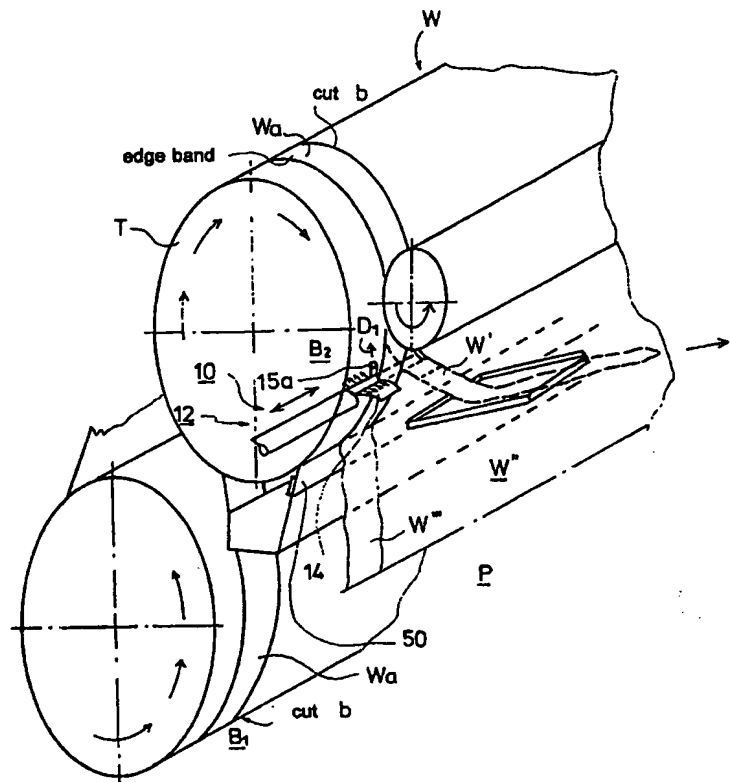




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>D21F 7/00</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 99/20834</b> <b>(43) International Publication Date:</b> 29 April 1999 (29.04.99)
<b>(21) International Application Number:</b> PCT/FI98/00803 <b>(22) International Filing Date:</b> 15 October 1998 (15.10.98) <b>(30) Priority Data:</b> 973986 17 October 1997 (17.10.97) FI <b>(71) Applicant (for all designated States except US):</b> VALMET CORPORATION [FI/FI]; Panuntie 6, FIN-00620 Helsinki (FI). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> AUTIO, Jukka [FI/FI]; Paska-Avenue 114, FIN-43500 Karstula (FI). <b>(74) Agent:</b> FORSSÉN & SALOMAA OY; Yrjönkatu 30, FIN-00100 Helsinki (FI).		<b>(81) Designated States:</b> AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> With international search report. In English translation (filed in Finnish).
<b>(54) Title:</b> METHOD AND EQUIPMENT IN CUTTING/GUIDING OF A LEAD-IN STRIP IN A PAPER/BOARD MACHINE		
<b>(57) Abstract</b>  The invention concerns a method and an equipment in cutting/guiding of a lead-in strip (W') in a paper/board machine. In the method, an equipment (10) is employed which comprises a cutting device (15), in which connection, by its means, an edge band (Wa), which has been formed out of the web (W) first, is cut off by passing the device (10) along a linear path (L <sub>1</sub> ). After this, by means of the blowing (S <sub>1</sub> ) produced by the blow device (13a <sub>1</sub> ) in the equipment (10), the lead-in strip (W') thus formed is separated from the face (T'; H <sub>1</sub> ) and transferred further in the paper/board machine by means of a support blowing (S <sub>2</sub> ) from the blow device (13a <sub>2</sub> ).		



**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

Method and equipment in cutting/guiding of a lead-in strip  
in a paper/board machine

5

The invention concerns a method and an equipment in cutting/guiding of a lead-in strip in a paper/board machine.

- 10 In the event of a web break, in order to provide a continuous run of the web from the initial end of the machine to the final end, a what is called lead-in strip is formed out of the web. This takes place in a certain position in the machine by first cutting a side band into the web and by passing the side band and the web initially as a single unit into the pulper. The lead-in strip is formed out of the side band in a certain position so that the side band is cut off and that the cut-off end is passed further in the machine, for example, into a rope feed and further in the machine. The lead-in strip thus formed can be guided into the rope feed, for example, by means of blowing, and along with the rope feed further in the machine. After completed threading of the lead-in strip, the lead-in strip can be widened to full width of the whole web.
- 15
- 20

- In the present patent application, it is suggested that for the formation of the lead-in strip a unit of equipment be used which can be brought into its position into connection with the edge band that has been cut. When the equipment in accordance with the invention is brought into said position, at the same time the equipment also cuts off the end of the edge band by means of a cutting device, preferably a water cutter, connected with the equipment. The end of the lead-in strip thus formed can be guided further by means of the separation blowing connected with the equipment and by means of the subsequent support blowing further, for example, into the rope feed.
- 25
- 30 Thus, in the method in accordance with the invention, by means of the equipment in accordance with the invention, the edge band can be cut off, and the cut edge band can be separated from the cutting face and transferred further. The cutting takes

place preferably against a roll face, but the cutting may also take place, for example, against a felt after a press nip. In such a case, for example, after the press nip in a separate press, the lead-in strip is cut off against a felt and transferred in accordance with the invention, by means of support blowings, directly into the dryer section into  
5 connection with the drying wire in the dryer section.

The method and the equipment in accordance with the invention are mainly characterized in what is stated in the patent claims.

10 The invention will be described in the following with reference to some preferred embodiments of the invention illustrated in the figures in the accompanying drawings, the invention being, yet, not supposed to be confined to said embodiments alone.

15 Figure 1A shows the equipment in accordance with the invention viewed from ahead.

Figure 1B shows the equipment viewed in the direction of the arrow  $K_1$  in Fig. 1A.

20 Figure 2A shows the equipment and the method in a stage in which the equipment is placed at the side of the paper machine.

Figure 2B shows a stage in which the equipment has been brought into the operating position and in which stage, at the same time, the cutting is carried out by means of  
25 the equipment.

Figure 2C shows the end A of the edge band after the cutting.

Figure 2D illustrates the cutting by means of a water jet  $D_1$ .

30

Figure 2E shows a stage in which the remaining part  $W''$  of the edge band is transferred into the pulper and in which stage the lead-in strip  $W'$  proper has been

formed and is separated from the roll T face T' and transferred further, favourably into the rope feed and further in the paper/board machine.

Figure 3 is an illustration of principle and an axonometric view of the location of the device in accordance with the invention in different stages of operation. The phase  
5 of control of the lead-in strip is illustrated by means of dashed lines.

Figure 4 shows an embodiment of the equipment in accordance with the invention, in which the equipment has been fitted after the last press in the press section, favourably the fourth press or a separate press, in which the equipment carries out  
10 cutting of the lead-in strip against a felt, and in which solution of equipment the lead-in strip W' is picked up by means of blowing from the face of the felt and is transferred by means of support blowing directly into connection with the dryer section K.

15 In a preferred embodiment of the invention, which is shown in Figs. 1A and 1B, the equipment 10 in cutting and guiding of the lead-in strip comprises a frame 11, which is an oblong arm part which is displaced by means of an actuator 12, preferably a cylinder device, along a linear path in the direction  $L_1$  or  $L_2$ . The parts that are  
20 displaced by means of the cylinder device 12, such as the frame 11, are denoted with the reference numeral 12b. The frame 11 and the connected parts 12b move in the same way as the piston rod, in the lateral direction. The parts 12b that are connected with the end of the frame 11 include, among other things, the blow devices 13a<sub>1</sub>, 13a<sub>2</sub>, the cutting device 15, and the transfer plate 14. Thus, by means  
25 of the actuator 12, the equipment 10 can be displaced on the whole in the lateral direction and along a linear path.

As is shown in Fig. 1B, the equipment comprises a first blow device 13a<sub>1</sub> and a second blow device 13a<sub>2</sub>. By means of the blowing produced by the first blow  
30 device 13a<sub>1</sub>, the cut-off lead-in strip W' is separated out of connection with the face, for example the face T' of the roll T, and by means of the second blow device 13a<sub>2</sub>, said cut-off lead-in strip W' is carried forwards into connection with the transfer

plate 14 and further, for example, into the rope feed or directly into a reel-up and so on. The equipment 10 in accordance with the invention further comprises a cutting device 15, most appropriately a water cutter, whose cutter nozzle 15a is fitted to be placed at the end of the frame part 11 and whose nozzle pipe 150 projects towards the side out of the construction, in which case the cutting-off can be carried out before the separation blowing carried out by the blow device 13a<sub>1</sub>.

The equipment in accordance with the invention favourably comprises a frame 11, at whose ends there are the blow devices 13a<sub>1</sub> and 13a<sub>2</sub>. The blow device 13a<sub>1</sub> can be a pipe of circular section, whose nozzle openings are placed on the face of the pipe, which permits directing of the blow air, for example, at the roll T face T'. In a corresponding way, as is shown in the figure, the blow device 13a<sub>2</sub> can be a tubular frame part of a section narrowing towards its end, on whose side face the nozzle openings are placed, in which connection the blowing can be applied out of the interior of the pipe 110. The transfer plate 14 is fixed in connection with the pipe of the blow device 13a<sub>2</sub> on the frame 11. The pipe 150 which feeds cutting liquid, preferably cutting water, for the cutting device 15 has been fitted at the outer edge of the device 10, in which case the cutter nozzle 15a has been passed to the side so that, when the frame 11 is displaced (in the direction L<sub>1</sub>), the cutting device 15 first performs the cutting of the end of the edge band Wa. The cutting takes place in a stage in which the roll T is then rotated, and the edge band Wa is passed into the pulper P. In such a case the cut-off result A becomes diagonal. The cut b of the edge band Wa in the machine direction has been carried out in some earlier position B<sub>1</sub>, for example, by means of a water cutter device (not shown).

25

As is shown in Fig. 2A, the device 10 in accordance with the invention is brought into connection with the web W. The cutting of the edge band Wa that forms the lead-in strip W' into the web has taken place in a position B<sub>1</sub> preceding the position B<sub>2</sub>. By means of the device 10 in accordance with the invention, the edge band Wa is cut off by means of a cutting device 15, favourably a device that produces a pressurized water jet D<sub>1</sub>. In the stage shown in Fig. 2A, the equipment 13a<sub>1</sub>, 13a<sub>2</sub>, 14, 15 is placed in a position pulled to the side. In the embodiment shown in Fig.

30

2B, the equipment is transferred in the direction of the arrow  $L_1$  so that the cutting device 15 carries out the cutting-off of the edge band  $W_a$ , in which case, as is shown in Fig. 2C, the lead-in strip  $W'$  thus formed obtains a diagonal cut-off end A. The lead-in strip  $W'$  is passed further in the machine. The web portions  $W''$  and  
5  $W'''$  are passed past the doctor 50 into the pulper P.

As is shown in Fig. 2C, the lead-in strip  $W_a$  has been cut off by means of a water jet  $D_1$  produced out of the cutter nozzle 15a of the cutting device 15. The cutting takes place against the face  $T'$  of a rotated roll T. The portion of the edge band  $W_a$  placed at the inlet side constitutes the lead-in strip  $W'$ , and the portion  $W'''$  is passed  
10 into the pulper P.

In Fig. 2D, the cutting takes place by means of a water jet  $D_1$ . The lead-in strip consists of the inlet portion  $W'$ , and the outlet portion  $W'''$  is passed into the  
15 pulper P.

As is shown in Fig. 2E, the outlet portion  $W'''$  of the band that forms the lead-in strip falls along with the rotated roll T into the pulper P, and the lead-in strip  $W'$  is separated, in the way shown in the figure, by means of a separation blowing  $S_1$  from  
20 the roll T face  $T'$  and transferred by means of said separation blowing  $S_1$  into connection with the transfer blowing  $S_2$ . The medium in the separation blow jet  $S_1$  produced out of the blow nozzle 13a<sub>1</sub>' is preferably air, and so also the medium in the transfer blow jet  $S_2$  is air. The transfer blowing  $S_2$  produced out of the transfer blow nozzle 13a<sub>2</sub>' transfers, as is shown in Fig. 2E, the cut-off lead-in strip  $W'$  over  
25 the guiding plate 14 further, for example, into the rope feed or along with other support blowings forwards.

Fig. 3 is an illustration of principle of the treatment and the further transfer of the lead-in strip in accordance with the invention. In Fig. 3, the cutting off of the lead-in strip and its position of further transfer are illustrated by means of dashed lines, and  
30 in the figure the solid lines illustrate the position that precedes the cutting-off, in which position the web W proper and the edge band  $W_a$  cut from the web, out of

which edge band the lead-in strip W' is formed, are transferred over the doctor 50 into the pulper P.

Fig. 4 shows an embodiment of the invention in which there is a press 100, which  
5 comprises two press felts  $H_1$  and  $H_2$  passed through the nip  $N_1$  formed between the  
press rolls  $60a_1, 60a_2$ . After the press 50, the edge band Wa is cut off by means of  
the device 10 in accordance with the invention to form the lead-in strip W'. The  
lead-in strip W' is transferred by means of blowings  $S_1$  and  $S_2$  directly into connec-  
10 tion with the dryer section K. The blowing  $S_1$  separates the cut-off lead-in strip W'  
from the face of the felt  $H_1$ . The second blowing  $S_2$  transfers the lead-in strip W'  
over the transfer plate or guide plate 14 further in the machine. The arrangement in  
respect of the device and of the operation is the same as in the embodiments  
described above. In connection with the dryer section K, there is a what is called PR  
box (PR), by whose means the lead-in strip is sucked into contact with the lower  
15 face of the wire  $H_3$ . Further, in this embodiment, it is possible to employ a paper  
guide roll F, which can also be a suction roll, by whose means the transfer of the  
lead-in strip W' from the felt  $H_1$  into connection with the dryer section K is pro-  
moted. In the figure, the dashed lines illustrate the position of cutting-off of the lead-  
in strip W' in the equipment 10, and the full lines illustrate the position in which the  
20 equipment 10 is placed when not in operation, at the side of the machine before the  
cutting-off that takes place against the felt  $H_1$ .



## Claims

1. A method in cutting/guiding of a lead-in strip (W') in a paper/board machine, characterized in that, in the method, an equipment (10) is employed which comprises a cutting device (15), in which connection, by its means, an edge band (Wa), which has been formed out of the web (W) first, is cut off by passing the device (10) along a linear path (L<sub>1</sub>), after which, by means of the blowing (S<sub>1</sub>) produced by the blow device (13a<sub>1</sub>) in the equipment (10), the lead-in strip (W') thus formed is separated from the face (T') and transferred further in the paper/board machine by means of a support blowing (S<sub>2</sub>) from the blow device (13a<sub>2</sub>).  
5  
10
2. An equipment as claimed in the preceding claim, characterized in that, in the method, a device that produces a pressurized water jet is employed as the cutting device (15), the cutting jet (D<sub>1</sub>) being produced out of the cutter nozzle (15a).  
15
3. An equipment as claimed in the preceding claim, characterized in that, in the method, as the device for transfer of the equipment (10), an actuator (12) is used which is favourably a cylinder device, by whose means the frame (11) and the connected means (13a<sub>1</sub>, 13a<sub>2</sub> and 15) are displaced along a linear path.  
20
4. An equipment in cutting/guiding of a lead-in strip (W') in a paper/board machine, characterized in that the equipment (10) comprises a displaceable cutting device (15), by whose means the edge band (Wa) is cut off to form a lead-in strip (W'), and that the equipment comprises a blow device (13a<sub>1</sub>), and the lead-in strip (W') thus formed is transferred by means of a separation blowing (S<sub>1</sub>) produced by said blow device (13a<sub>1</sub>) further into connection with a support blowing (S<sub>2</sub>) produced from a blow device (13a<sub>2</sub>) and further forwards.  
25
5. An equipment as claimed in the preceding claim, characterized in that the equipment comprises a transfer plate (14) in connection with the second blow device (13a<sub>2</sub>), the lead-in strip (W') being guided by means of the transfer plate (14) further in the machine.  
30

6. An equipment as claimed in any of the preceding claims, **characterized** in that the equipment (10) comprises a cutting device (15), whose cutter nozzle (15a<sub>1</sub>) is placed outermost on the frame part (11) of the device (10), in which case, when the device is transferred along a linear path (L<sub>1</sub>), the cutting device cuts off the edge band (Wa), which has been formed first in an earlier position (B<sub>1</sub>), so that the edge band (Wa) that is passed into the pulper (P) at the location of the cutter device (15) can be formed into the lead-in strip (W') and passed further in the machine.
7. An equipment as claimed in the preceding claim, **characterized** in that the cutting device (15) is preferably a water cutter, by whose means a pressurized water jet (D<sub>1</sub>) is applied to the web face to cut-off the web, and that the cutting device (15) comprises a nozzle pipe (150), which comprises a cutter nozzle (15a) at its end, through which nozzle the pressurized water is applied to the face to be cut.
8. An equipment as claimed in any of the preceding claims, **characterized** in that the equipment comprises a frame (11) on which there are the blow pipe (130a<sub>1</sub>) of the first blow device (13a<sub>1</sub>) and the blow pipe (130a<sub>2</sub>) of the second blow device (13a<sub>2</sub>) and the nozzle pipe (150) of the water cutter device (15).
9. An equipment as claimed in any of the preceding claims, **characterized** in that the equipment (10) is placed in connection with the roll (T) face (T'), and that the roll (T) is preferably a heated steam cylinder.
10. An equipment as claimed in any of the preceding claims, **characterized** in that the equipment has been fitted after the nip (N<sub>1</sub>) formed between the press rolls (60a<sub>1</sub>, 60a<sub>2</sub>) in a press into connection with a transfer felt (H<sub>1</sub>) passed through the nip (N<sub>1</sub>), the cutting of the lead-in strip taking place against the felt (H<sub>1</sub>), and that the end of the lead-in strip (W') cut off by means of the equipment (10) can be transferred away from the felt (H<sub>1</sub>) and further by means of support blowings (S<sub>1</sub>, S<sub>2</sub>) into the dryer section (K).

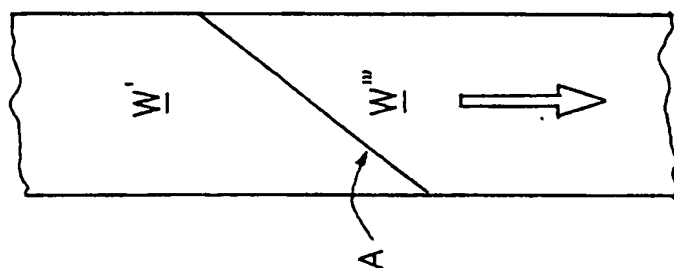
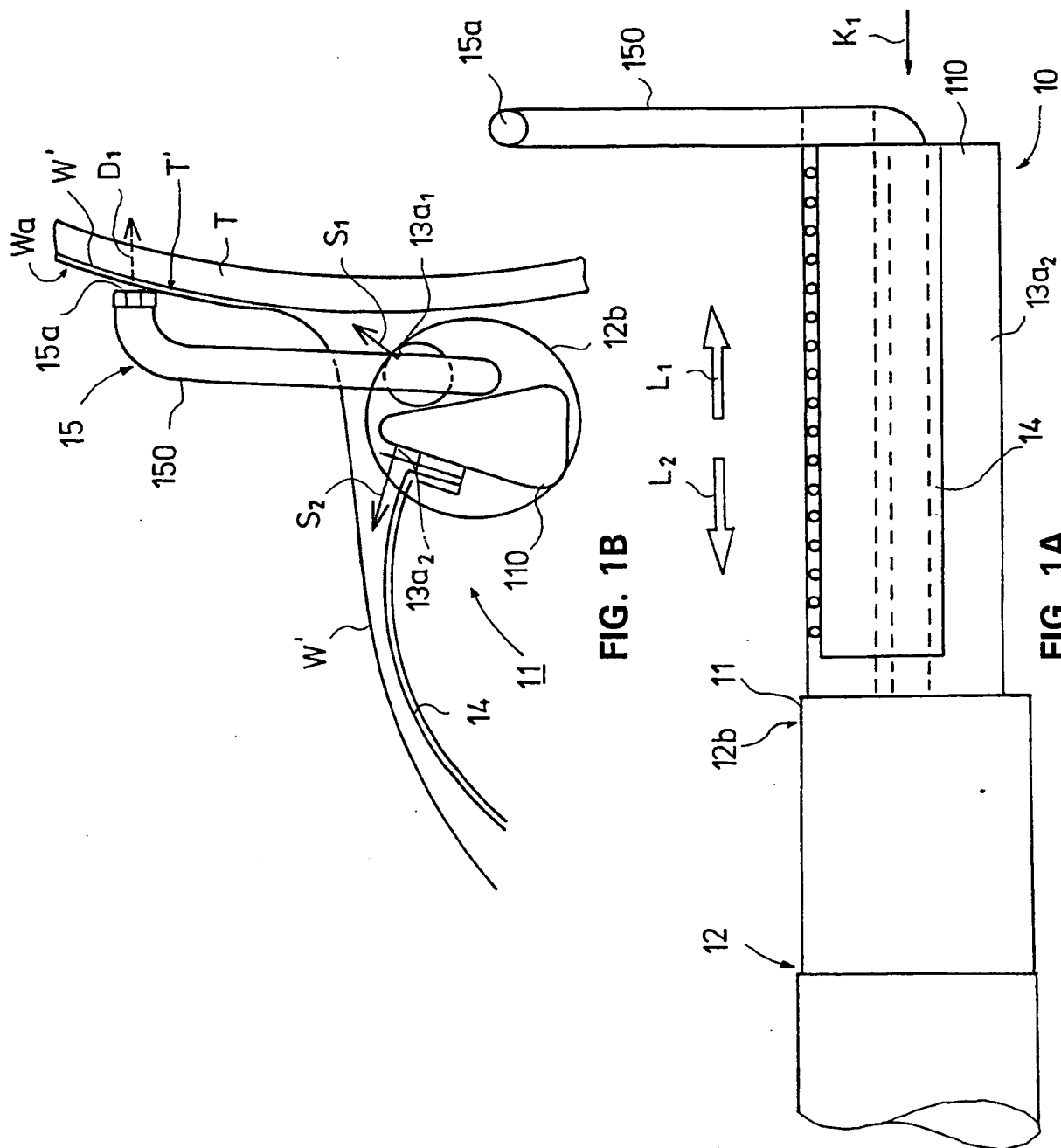
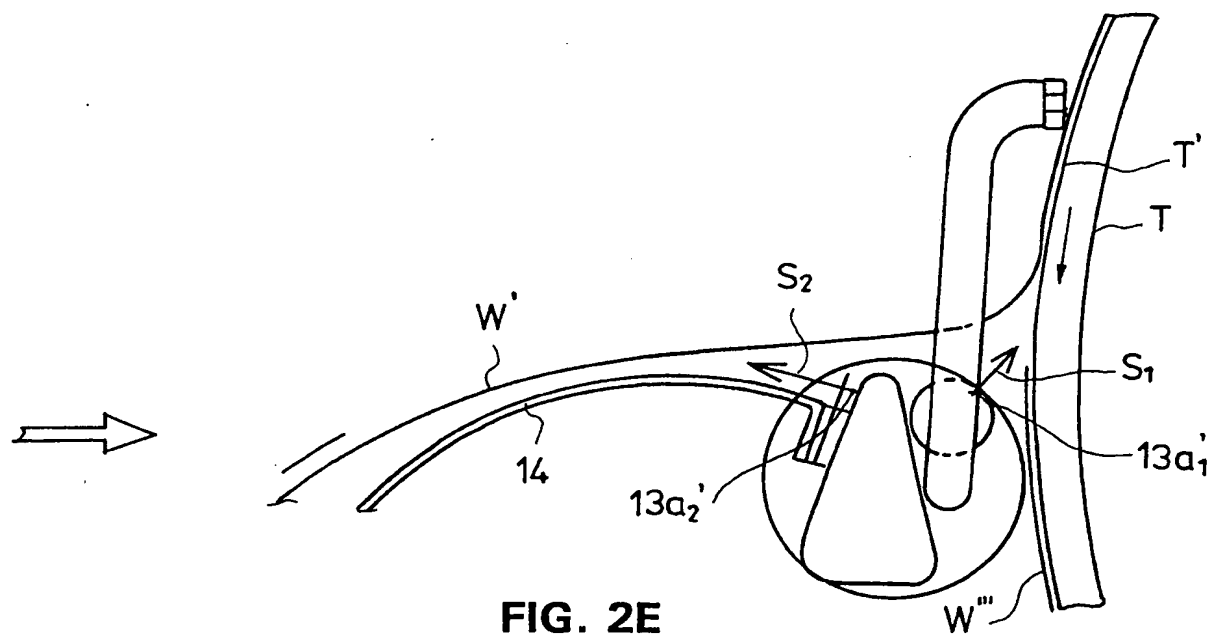
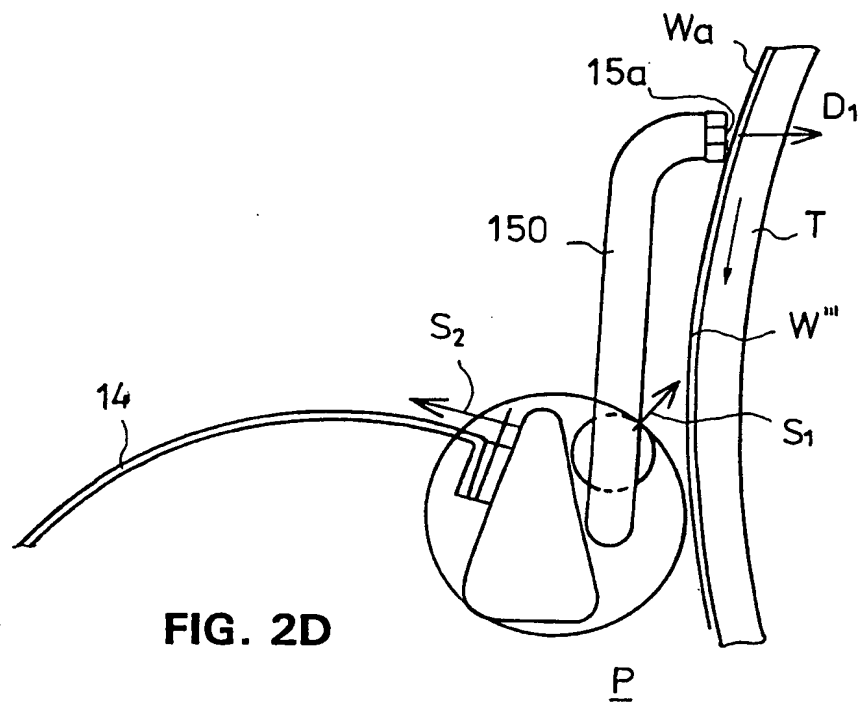
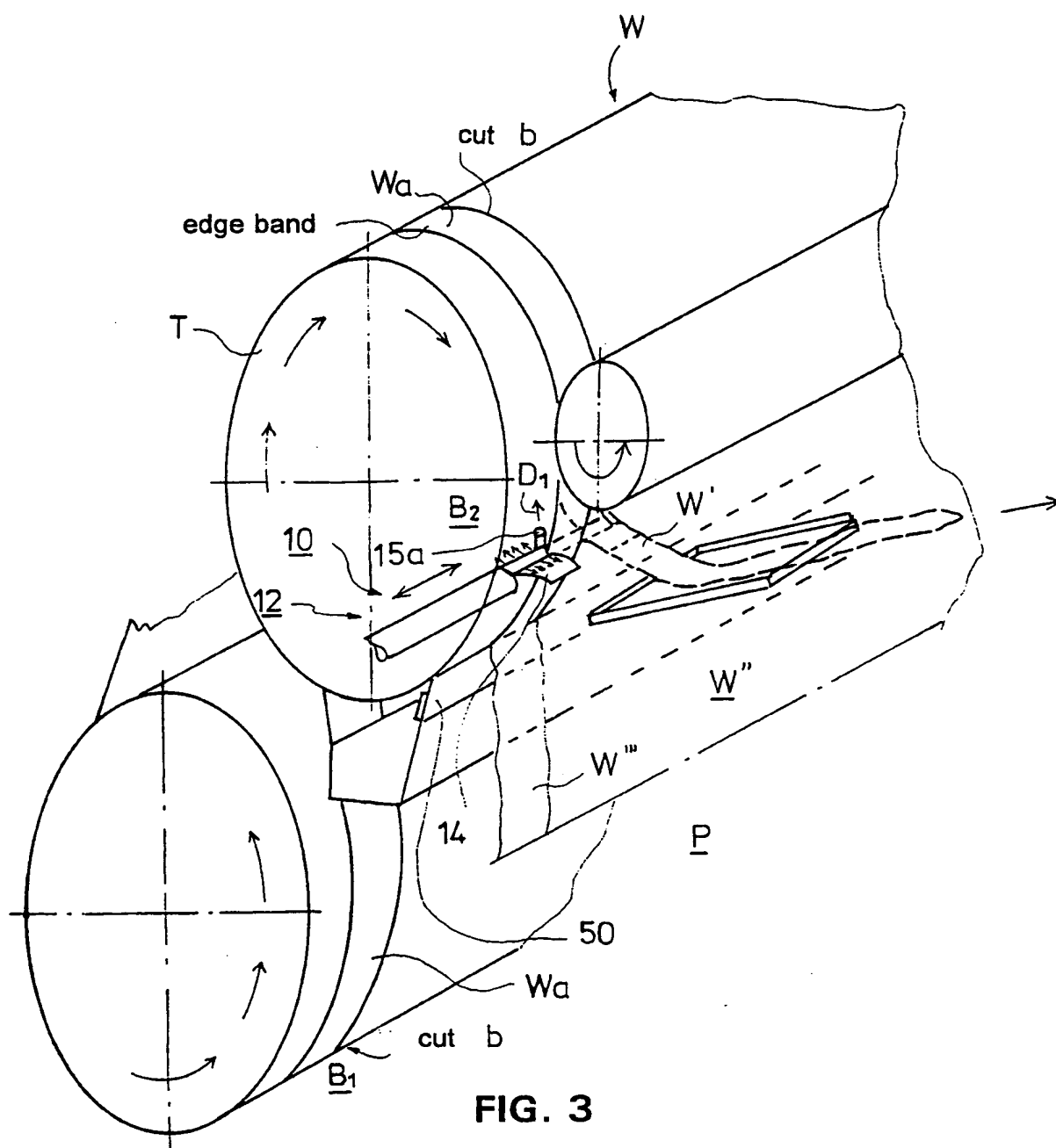


FIG. 2C









## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 98/00803

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: D21F 7/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: D21F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5622601 A (RICHARD J. ADAMS ET AL), 22 April 1997 (22.04.97), column 3, line 34 - column 4, line 49; column 5, line 22, figures 1,3-5  --	1-10
Y	CA 1323384 C (LIEDES ALLAN ET AL), 19 October 1993 (19.10.93), page 8, line 4 - line 17, figures 3,5, claims 1,14, abstract  -- -----	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

29 January 1999

Date of mailing of the international search report

04-02-1999

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Olov Jensen  
Telephone No. +46 8 782 25 00



**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

21/12/98

International Application No.

PCT/FI 98/00803

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
US	5622601	A	22/04/97	NONE	
CA	1323384	C	19/10/93	DE 6890396 U	04/02/93
				EP 0326535 A,B	02/08/89
				SE 0326535 T3	
				FI 78528 B,C	28/04/89
				FI 880350 D	00/00/00
				US 4923567 A	08/05/90